

### ABSTRACT OF THE DISCLOSURE

A microfluidic sieve having a substrate with a microfluidic channel, and a carbon nanotube mesh. The carbon nanotube mesh is formed from a plurality of intertwined free-standing carbon nanotubes which are fixedly attached within the channel for separating, concentrating, and/or filtering molecules flowed through the channel. In one embodiment, the microfluidic sieve is fabricated by providing a substrate having a microfluidic channel, and growing the intertwined free-standing carbon nanotubes from within the channel to produce the carbon nanotube mesh attached within the channel.